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April 9, 1998

BY HAND

Magalie Roman Salas
Secretary
Federal Communications Commission
Room 222
1919 M Street, N.W.
Washington, DC 20554

Re: Amendment of Parts 21 and 74 to Enable Multipoint Distribution Service and Instructional Television Fixed Service Licensees to Engage in Fixed Two-Way Transmissions, MM Docket No. 97-217, RM-9060
EX PARTE

Dear Ms. Salas:

We are writing on behalf of the Catholic Television Network ("CTN") as part of CTN's continuing effort to recommend rules in this proceeding that will facilitate the deployment of two-way services on ITFS and MDS frequencies without compromising the unique educational value of the ITFS spectrum. CTN wants MDS and ITFS licenses to have the ability to deploy new two-way services because such services will benefit both the wireless cable operators with whom CTN's members have partnered, and CTN's members directly by enhancing the value of the ITFS spectrum. However, as CTN has pointed out in its Comments and Reply Comments in this proceeding, the proposed rules are inadequate because they pose a significant risk of interference to existing and future ITFS operations.

Notwithstanding the significant deficiencies CTN has identified and documented with the help of an outstanding engineering team, Petitioners have resorted to escalating rhetoric designed to divert attention away from the problems

associated with their proposals.[1] In doing so, Petitioners have failed to give adequate consideration to the fact that they operate in highly encumbered spectrum. Although Petitioners would like to have technical and operational freedoms similar to those granted in other interactive wireless services, the Commission must account for the presence of incumbent ITFS licensees, a factor not present in the spectrum used in other interactive services. ITFS incumbents use their licensed frequencies in very different ways than wireless cable operators, and CTN has good reason to believe that the proposed rules could be damaging to ITFS operations. Unfortunately, CTN's constructive efforts to deal with these concerns have been met with name-calling and howls of protest from Petitioners that do not assist the Commission in developing well-grounded rules and policies.[2]

Petitioners' Proposals Will Cause Harmful Interference. CTN has pointed out that Petitioners' proposal to intermix upstream response station transmissions with downstream ITFS operations is virtually certain to cause harmful interference to ITFS receive sites.[3] This position is premised on the advice of John F.X. Browne and Associates, Denny & Associates, and Hammett & Edison -- *three* prominent consulting engineering firms, each with many years' experience in the ITFS and MDS fields. This engineering team has identified two serious interference threats, which, under the proposed rules, could have a devastating effect on the ongoing educational functions of ITFS licensees in two-way markets.

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1 *See* Letter from Paul Sinderbrand to Magalie Roman Salas, MM Docket No. 97-217 and RM-9060 (March 6,1998) ("Sinderbrand Letter").

2 While Petitioners deride CTN's efforts, Petitioners have also misrepresented to the Commission the extent to which they represent the educational community. *See* Letter from Paul Sinderbrand to Magalie Roman Salas (March 12, 1998) (claiming to represent "the group of 113 participants in the wireless cable industry that submitted the petition for rulemaking that commenced this proceeding"). In fact, at least two educators have withdrawn from that group, a fact known to Petitioners. *See* Letter from Paul Sinderbrand to William F. Caton (May 27, 1997) (advising Commission of withdrawal of Archdiocese of Chicago); Letter from Julia L. Frey to Magalie Roman Salas (Feb. 17, 1998) (advising Commission of withdrawal of Diocese of Orlando).

3 *See* Comments of CTN, MM Docket No. 97-217, at 8, 15, and accompanying Joint Engineering Exhibit (Jan. 8, 1998); Reply Comments of CTN at 3, 12 (Feb. 9, 1998).

a. Brute-Force Overload

One of the serious interference threats CTN has identified is brute-force overload of ITFS downconverters caused by response station transmitters. Although Petitioners initially conceded that CTN was correct that brute-force overload is potentially a serious threat to ITFS operations,[4] they now claim that they have "consistently disputed CTN's contentions" in this regard.[5] Petitioners also quote from another party's filing, stating that "[c]ompetent engineers . . . believe that incidents of brute-force overload, if they happen, will be isolated and can be cured with appropriate technical solutions."[6] However, the Commission cannot base its decisions on third party references to phantom "competent engineers" in the face of record evidence submitted by three well-known engineering firms in support of CTN's position.[7]

In fact, a recent filing by Petitioners establishes that Petitioners have significantly *underestimated* the incidence of brute-force overload in at least two ways. First, the filing reveals that Petitioners specified a different antenna in their brute-force overload calculations than they intend to use in practice.[8] As explained in detail in the accompanying Joint Engineering Statement, the actual antenna will create a larger area of brute-force overload.[9] Second, Petitioners previously claimed that brute-force overload could be minimized through the simple expedient of cross-

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4 Comments of Petitioners at 90 (Jan. 8, 1998) ("Petitioners cannot say that such interference will never occur if the rules proposed in the Petition are adopted").

5 *See* Sinderbrand Letter at 6.

6 Sinderbrand Letter at 7, *quoting* DL&A ITFS Parties' Comments at 6.

7 *See* Joint Engineering Exhibits attached to Comments of CTN and Reply Comments of CTN, as well as the new Joint Engineering Statement, attached hereto as Exhibit A ("Supplementary Engineering Statement").

8 *See* Reply Comments of Petitioners, Example of Proposed Two-way System Interference Analysis.

9 *See* Supplementary Engineering Statement at ¶ ¶ 1-3.

polarizing response station transmitters relative to ITFS transmitters.[10] Petitioners themselves have now demonstrated that this is impossible because of the need to alternate polarization of the sectors of a response station hub in order to achieve proper isolation.[11] Again, this issue is addressed in the accompanying Joint Engineering Exhibit.[12]

b. Adjacent-Channel Interference

A second and potentially far more serious interference threat identified by CTN is adjacent-channel interference to ITFS operations from upstream response station transmissions. Petitioners accuse CTN of "provid[ing] the Commission with absolutely no technical analysis" on this issue.[13] However, having established that brute-force overload is a threat to ITFS operations, simple engineering analysis demonstrates that harmful adjacent-channel interference is even more likely to occur, and is likely to cause widespread disruption to ITFS operations under Petitioners' proposed rules.

As the accompanying Joint Engineering Statement makes clear, the existence of brute force overload implies that ITFS receive sites will experience desired-to-undesired (D/U) signal ratios of approximately -20 dB.[14] Obviously, if the desired signal and the undesired signal in such a case were on adjacent channels, this ratio would constitute harmful interference within the Commission's definition of that term since the ratio is less than 0 dB.[15] Assuming a typical antenna such as Petitioners have proposed, a response station transmitter will be capable of causing

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10 *See* Comments of Petitioners at 92 n.123 ("[I]n the vast majority of markets, all ITFS stations are licensed to operate from the same site using the same polarization. Thus, it would not be difficult to cross-polarize response stations relative to the downstream ITFS stations in a market.").

11 Reply Comments of Petitioners, Example of Proposed Two-way System Interference Analysis, at 2.

12 Supplementary Engineering Statement at ¶ 4.

13 Reply Comments of Petitioners at 50.

14 *See* Supplementary Engineering Statement at ¶ 7.

15 *See* 47 C.F.R. § 74.903(a)(2) (harmful adjacent-channel interference exists when D/U ratio is less than 0 dB).

harmful interference to adjacent-channel receive sites within an area of as much as *3.6 square miles* surrounding the transmitter, at a distance of *nearly 3 miles away.*[16] This is clearly a severe problem that must be dealt with in any rules adopted in this proceeding.

Frequency Separation is Necessary to Control Harmful Interference. CTN has devoted considerable resources towards finding a way to permit two-way operations over ITFS and MDS frequencies while alleviating the interference concerns described above. In doing so, CTN has carefully considered the comments of educators and wireless cable operators, and its proposals have evolved accordingly over the course of this proceeding.

In response to CTN's efforts, Petitioners complain about the number of proposals CTN has advanced,[17] imply that CTN has negotiated in bad faith,[18] and accuse CTN of a "strange shift in position."[19] This is nothing but name-calling to cover up an inability to respond.[20] CTN has never wavered from the core principle that protection from interference must be achieved through frequency separation. Moreover, as CTN has repeatedly demonstrated, frequency separation need not leave any vacant spectrum.

CTN seeks merely to ensure that two-way rules provide at least 6 MHz frequency separation between upstream operations and ITFS downstream operations. CTN has offered three ways in which such frequency separation can be

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16 Supplementary Engineering Statement at ¶ 10-11.

17 *See* Sinderbrand Letter at 6 ("For the third time in the last four months, CTN has advanced a new plan . . .").

18 *See* Reply Comments of Petitioners at 54 ("Misapplying information provided to CTN by the Petitioners in a good faith effort to educate CTN . . .").

19 *See* Sinderbrand Letter at 6 n.10.

20 *See id.* at 6 ("CTN has proposed a solution that is far worse than the disease"). In the five pages of discussion that follow this remark, Petitioners offer no alternative cure.

achieved, and remains open to other possibilities.[21] Frequency separation will eliminate the possibility of co-channel and adjacent-channel interference from upstream transmissions to downstream ITFS operations. It will eliminate the need for educators with limited budgets for legal and engineering resources to evaluate analyses based on Petitioners' complex algorithm purporting to predict average interference. And it will eliminate the preclusive effect of Petitioners' proposals on the growth and development of ITFS as an educational resource.[22]

CTN has consistently maintained that, rather than leave the guardband empty, the Commission should permit commercial downstream operations within 6

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21 CTN's initial plan would have rearranged the ITFS and MDS spectrum to create a 24 MHz guardband separating response station transmissions from ITFS downstream transmissions, which would have permitted the use of filters to mitigate brute-force overload. *See* Request for Supplemental Comment Period and Extension of Time, MM Docket No. 97-217 (Nov. 25, 1997). Responding to concerns of many parties, CTN then suggested a notification and testing procedure as a more acceptable method of controlling brute-force overload. *See* Comments of CTN at 12-14. The use of a notification and testing procedure enabled CTN to (i) propose a reduction in the size of the guard band to 6 MHz, and (ii) offer a plan that would allow nearly unrestricted use of MDS frequencies for upstream transmissions. *Id.* at 15-19. Petitioners then complained that this plan would deprive ITFS licensees of their ability to take advantage of two-way operations. *See* Reply Comments of Petitioners at 49. So, CTN offered a third plan in which each licensee of an ITFS station could "turn around" one channel for response station transmissions. *See* Reply Comments of CTN at 21-23. Still Petitioners find this too restrictive, but offer no alternative. *See* Sinderbrand Letter at 9.

22 Petitioners downplay this preclusionary effect, attempting to analogize the need to protect a new response station hub to the need to protect a new ITFS receive site. But this analogy fails completely. Unlike ITFS receive sites, a response station hub has the right to use an omnidirectional receiving antenna. *Compare* 47 C.F.R. § 74.937 (recommending directional antennas for use in receive sites) *with* Sinderbrand Letter at 2 ("omnidirectional coverage will be required"). In other words, Petitioners are proposing to license receiving stations of a kind never seen in the history of this service, and ask the Commission to believe this is nothing more than business as usual.

MHz of frequencies used for upstream transmissions.[23] Petitioners should welcome this idea, because it provides wireless cable operators maximum freedom to arrange a commercial two-way system, while protecting ITFS operations from harmful interference. Under CTN's proposal, a wireless cable operator can use any MDS channel, or any leased ITFS channel, for commercial downstream transmissions, just as it can under the present one-way rules. A wireless cable operator may also use any MDS channel, or any leased ITFS channel, for upstream transmissions, as long a 6 MHz separation is maintained from any channel used for ITFS downstream operations.

Instead of welcoming CTN's proposal, Petitioners accuse CTN of the irrational belief that upstream transmissions somehow threaten ITFS transmissions, but not commercial downstream transmissions.[24] As CTN has previously explained,[25] and reiterates in the accompanying Joint Engineering Statement,[26] CTN believes that upstream transmissions pose an interference threat to *all* co-channel or adjacent-channel downstream operations, including those of commercial MDS operators. At the same time, CTN recognizes that commercial MDS operators have the incentive, and may have the ability, to avoid interference to their own downstream transmissions, and those of their paying subscribers, from upstream transmissions. Accordingly, the decision whether to use a guardband in practice to protect *commercial* downstream transmissions should be left to the marketplace. That is, a wireless cable operator should have the flexibility to engineer a system that places commercial downstream transmissions immediately adjacent to upstream transmissions, or alternatively to use a guardband if it deems

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23 *See* Request for Supplemental Comment Period and Extension of Time, Joint Engineering Exhibit at ¶ 7 and Figure 1; Comments of CTN, Joint Engineering Exhibit, at ¶¶ 10, 15 and Figure 2.

24 *See* Sinderbrand Letter at 6 n.10 ("CTN cannot have it both ways"). In the same footnote, Petitioners accuse CTN of "a strange shift in position." *Id.* However, CTN has never changed its position with respect to the placement of commercial downstream transmissions adjacent to frequencies used for upstream transmissions. *See supra,* note 23 and accompanying text.

25 *See* Request for Supplemental Comment Period and Extension of Time, Joint Engineering Exhibit, at ¶ 8b; Comments of CTN, Joint Engineering Exhibit, at ¶ 12; Reply Comments of CTN at 17-19.

26 Supplementary Engineering Statement at ¶¶ 16-18.

one necessary. On the other hand, under the proposed rules, ITFS licensees would have only a wireless cable operator's promise to correct any interference that may be caused by upstream operations. Therefore, unlike commercial downstream transmissions, *ITFS* downstream transmissions must be safeguarded through rules.

There is no inconsistency in CTN's approach. The existing one-way rules permit interference protections to be waived by mutual consent of the parties involved.[27] Thus, under the existing rules, systems can be engineered in particular cases to operate in situations that would otherwise cause interference. CTN fully expects that a wireless cable operator can similarly engineer a two-way system to avoid interference to its own downstream transmissions once two-way rules are adopted. However, a rule is still necessary to protect ITFS downstream transmissions, because ITFS licensees will have no knowledge of a wireless cable operator's deployment of particular response station transmitters. *Petitioners, in effect, are asking ITFS operators to consent in advance to the installation of numerous adjacent channel transmitters without specifying where the transmitters will be located, in which direction they will be oriented, and what power they will use.* No ITFS licensee should give such a consent under the current one-way rules, and ITFS licensees likewise should not be expected to consent under two-way rules.

CTN is at a loss to understand Petitioners' resistance to the concept of frequency separation. It does not restrict the ability of a wireless cable operator to deploy the two-way system of its choice, nor does it reduce the amount of spectrum available for either upstream or downstream transmissions. In any two-way system, there must be at least one point in the frequency table at which upstream transmissions and downstream transmissions are adjacent, or as nearly adjacent as can be engineered. CTN's proposal would simply require that this dividing line be placed next to a commercial channel, or an ITFS channel leased for commercial downstream purposes.

Post-Hoc Interference Resolution is Unacceptable. Reading through the rhetoric, it is apparent that Petitioners reject frequency separation on the theory

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[27] *See* 47 C.F.R. § 74.903(b)(4) (permitting a statement accepting interference in lieu of an interference study).

that any interference can be resolved on a *post hoc* case-by-case basis.[28] CTN cannot emphasize strongly enough that Petitioners' offer to resolve interference on a *post hoc* basis is completely unacceptable.[29]

As the Commission well knows, disputes over interference resolution can drag on for months while the interference continues unabated. Interference from digital signals, which are noise-like and may be low in power, is particularly difficult and time-consuming to locate.[30] Educators cannot afford these kinds of delays. ITFS stations transmit instructional programming to students enrolled in for-credit courses. If a teacher expects to receive a science program at a particular time, but instead receives interference from a newly installed upstream transmitter in a nearby office building, the teacher will face a disruptive class with no lesson plan. If this happens several times in a row, the teacher may simply give up on the instructional program for the duration of the school year, and all of the potential value of ITFS will be lost.

ITFS has always been carefully engineered to avoid interference before it occurs. There is no reason to lose that interference protection when moving to a two-way regime. CTN's simple proposal to separate the frequencies on which ITFS programming is transmitted from those used for commercial upstream response transmissions restores the needed protection to Petitioners' proposals for the service.

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28 *See* Sinderbrand Letter at 5 ("both parties are required to employ in good faith the available interference mitigation techniques outlined by Petitioners in their comments").

29 Petitioners imply that CTN is inconsistent in rejecting a post hoc interference resolution process for MDS response station transmitters while accepting such a process in the case of Wireless Communications Services ("WCS"). Reply Comments of Petitioners at 62 n.149. However, these positions are not inconsistent. The existence of a guard band of 140 MHz between WCS and ITFS frequencies assures that WCS signals can, if required, be filtered out before they reach the downconverter. No such safeguard exists in the case of MDS response station transmitters.

30 *See* Supplementary Engineering Statement at ¶ 24.

Other Issues. CTN was surprised that Petitioners would respond to CTN's well-documented engineering analysis through mere assertions by Petitioners' attorney, with no engineering support at all. In doing so, Petitioners' attorney made a number of engineering errors which are addressed in the accompanying Supplementary Engineering Statement and summarized below.

Petitioners claim that the use of 20 dBi gain instead of 10 dBi gain antennas in response station hubs would be impractical. None of Petitioners' reasons in support of this claim withstands scrutiny. (Supplementary Engineering Statement at ¶¶ 12-13.) Since there is no reason why response station hubs cannot use 20 dBi gain antennas, the Commission should limit the power of response station transmitters to 18 dBw EIRP as it has proposed.

Petitioners claim that CTN "got it backwards" when it pointed out that the rules for response station hubs disadvantage analog ITFS licensees. CTN had it right, and Petitioners' attempts to turn the argument around are nonsensical. (Supplementary Engineering Statement at ¶¶ 14-15.)

Petitioners claim that CTN has ignored their revisions to the rules regarding the use of omnidirectional antennas with response station transmitters. However, the rule revisions referred to by Petitioners (requiring the use of directional antennas) are meaningless because they do not specify how much an antenna must deviate from an omnidirectional pattern to be permissible. (Supplementary Engineering Statement at ¶¶ 19-21.)

Petitioners mischaracterize CTN's proposal to impose a -76 dBm receive carrier level threshold test on a "desired" signal that must be protected from interference. In fact, CTN's comments specifically recognized that different thresholds would be appropriate for digital transmissions. (Supplementary Engineering Statement at ¶¶ 22-23.)

* * * *

CTN seeks relatively modest rules and policies to protect the educational value of ITFS and permit successful deployment of two-way services. A summary of CTN's proposed solutions to the problems it has identified with Petitioners' proposals is attached as Appendix A.

CTN sees great potential in the ability of two-way rules to enhance distance learning. However, Petitioners' current enthusiasm must be tempered by a recognition that ITFS, which predates wireless cable and may well outlast wireless cable, is a unique and valuable public resource that deserves protection in its own right.

Respectfully submitted

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Of Counsel

Enclosure

cc: Hon. William E. Kennard
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Hon. Harold Furchtgott-Roth
Hon. Michael K. Powell
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APPENDIX A
CTN Modifications to Proposed Two-Way Rules

1. ***Problem.*** The rules as currently proposed create an unacceptable threat of (i) interference to ITFS operations caused by response station transmissions on co-channel or adjacent-channel frequencies, and (ii) brute-force overload of ITFS downconverters caused by nearby response station transmitters on non-cochannel and non-adjacent channel frequencies. Educational programming cannot wait while engineers attempt to mitigate interference after the fact.

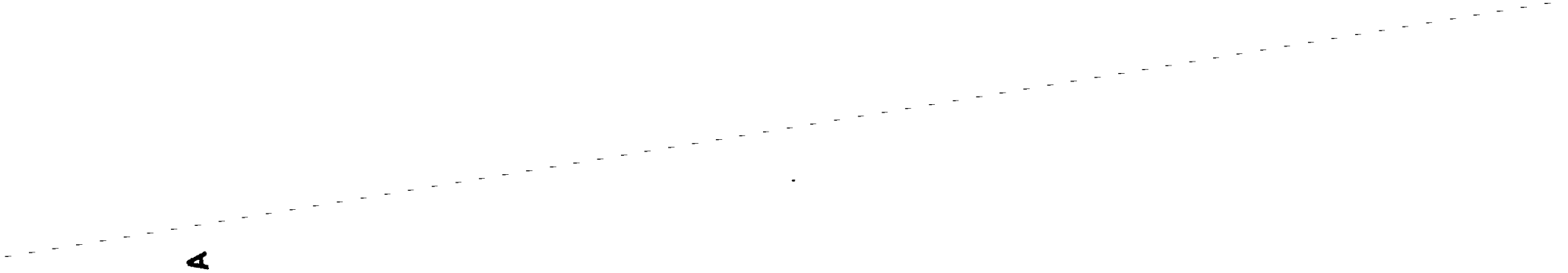
Solution: Separate ITFS downstream transmissions from upstream transmissions by at least 6 MHz to eliminate the possibility of co-channel and adjacent channel interference; require notification and testing of response stations installed in the immediate vicinity of a registered ITFS receive site to anticipate and relieve brute-force overload.

2. ***Problem.*** The current rules would make it virtually impossible to modify or expand ITFS facilities in a two-way market. Educators need to preserve the ability to grow to meet increasing demand for distance learning.

Solution: Separate ITFS downstream transmissions from upstream transmissions by at least 6 MHz to preserve the ability of ITFS stations to modify and expand; require contingency plans for continuing educational operations in case of wireless cable operator insolvency.

3. ***Problem.*** The current rules would limit the FCC's role in reviewing and approving applications for two-way services. The ITFS community needs the FCC's expertise and oversight to retain the high degree of engineering for interference-free operation that has characterized ITFS up to this point.

Solution: Adopt streamlined application processing rules to accelerate the grant of applications and facilitate the introduction of innovative technologies without overburdening the Commission's staff or abandoning staff review.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Catholic Television Network

Joint Engineering Exhibit in Support of *Ex Parte* Comments to MM Docket 97-217

April 3, 1998

HAMMETT & EDISON, INC.
CONSULTING ENGINEERS
SAN FRANCISCO

Catholic Television Network

Joint Engineering Statement of
John F.X. Browne, P.E., Robert W. Denny, Jr., P.E., and Dane E. Ericksen, P.E.

The firms of John F.X. Browne and Associates, P.C., Denny & Associates, P.C., and Hammett & Edison, Inc., have been retained jointly on behalf of the Catholic Television Network ("CTN"), representing numerous Instructional Television Fixed Service ("ITFS") stations licensed to, and operated by, the Roman Catholic Archdioceses and Dioceses throughout the United States, in support of supplemental CTN *ex parte* comments to MM Docket 97-217 concerning two-way, "cellularized" ITFS and Multipoint Distribution Service ("MDS") stations.

Petitioners' Reply Comments Divulge New Information that Supports CTN Position

1. In the Reply Comments of Petitioners, a "Revised Methodology" is provided as a detailed example of the new interference calculation methodology Petitioners propose the Commission adopt for two-way, "cellularized," upstream Response Station transmitters. We have reviewed the Revised Methodology and still feel that it is unduly complicated and continues to represent an unwarranted risk of new interference to existing ITFS stations. Further, there are significant technical flaws in the Petitioners' Revised Methodology that need to be brought to the Commission's attention.

2. At Paragraph 1 of the engineering exhibit submitted in support of the CTN Reply Comments, we noted:

> Petitioners discuss why CTN's concerns about BFO interference appear unwarranted. However, all of Petitioners' calculations are based on the assumption that a Response Station would use a transmitting antenna at least meeting the performance characteristics of the FCC reference antenna. Yet, Petitioners' omission of such a proposed requirement in their proposed rules comments indicates a desire not to be so constrained.

The antenna used in Petitioners' Revised Methodology is described as a Conifer Model PL2400, with a gain of 13 dBi. Conifer does not manufacture an antenna with this model number, but it does manufacturer a Model DL2400 antenna, with the same gain and similar azimuth pattern to that shown in the Revised Methodology, so it is assumed that the PL2400 designation was simply a typographical error.

3. The radiation pattern envelopes for both the horizontally-polarized and vertically-polarized versions of the Conifer DL2400 antenna have been obtained directly from the manufacturer, for MDS Channel 1, ITFS Channel A1, and ITFS Channel G4. Onto polar plots of each pattern was overlaid the radiation pattern envelope for the FCC reference antenna, as described in Section

74.937(a), Figure 1, of the FCC Rules. Not in a single case was the radiation pattern envelope of the Conifer DL2400 antenna entirely within the radiation pattern envelope of the FCC reference antenna. The two most egregious cases are shown in the attached figures 2A & 3A. This means that the main beam of the proffered antenna is less directive than the Commission's 2-foot "reference" antenna, meaning that its brute force overload ("BFO") "footprint" will be broader in the main beam than that derived using an antenna meeting the reference antenna radiation pattern envelope. Thus, this substantiates our conclusion that all of Petitioners' calculations attempting to rebut our concerns regarding BFO interference to non-co-channel/non-adjacent-channel ITFS downconverters are invalid, because they assumed a Response Station transmitting antenna meeting the radiation pattern envelope of the FCC reference antenna. Further, there would be nothing to prevent wireless cable operators from using even less directional Response Station transmitting antennas, representing an even greater BFO interference threat.

Revised Methodology Proves CTN Point that Some ITFS Receive Sites Will Be Parallel-Polarized to Response Station Transmitters

4. At Page 2 of its Revised Methodology exhibit, Petitioners state that the polarization of Response Station transmitting antennas "will be alternated between horizontal and vertical for each sector in order to give isolation within the cell as shown in Figure 2." Yet this design directly contradicts Petitioners' initial comments, where, at Page 92, Footnote 123, Petitioners insisted that all ITFS stations in a given area would operate with the same polarization, and that Response Stations would then use the opposite polarization so as to minimize the interference to ITFS receive sites. The Revised Methodology exhibit now shows that this will be an impossibility, because of alternating polarizations between Response Station sectors.

Basis for Claiming that Adjacent-Channel Upstream Response Station Transmitters are an Interference Threat to Downstream ITFS Service

5. Petitioners allege that CTN has provided the Commission "with absolutely no technical analysis which even purports to show that the operation of response stations within 6 MHz of an ITFS channel will invariably lead to interference" (Petitioners' Reply Comments, at Page 50). However, there should be no need to document the obvious.

6. So there can be no misunderstanding, we will now explain why our demonstration that an area around an ITFS receive site that is at risk of BFO interference from upstream Response Station transmitters is also a demonstration that ITFS receive sites that would be unfortunate enough to be operating on an adjacent channel to an upstream Response Station are also at risk.

While Petitioners argue that there is supposedly such a low likelihood of BFO interference that the Commission should not concern itself with the threat (and even if BFO interference should occur there would be a wealth of "simple" mitigation measures), Petitioners have clearly admitted that the possibility of BFO interference exists.

7. For BFO interference to exist to a non-co-channel/non-adjacent channel ITFS receive site, the undesired signal from the nearby Response Station transmitter must be much stronger than the downstream desired signal. This ratio can be estimated as approximately 20 dB, as follows:

- Assume an ITFS station with a maximum allowable EIRP of +63 dBm (2,000 watts)
- Assume an ITFS receive site 20 miles distant using the FCC 2-foot standard receiving antenna with a gain of 20 dBi
- Assume mid-band operation on Channel C3 (2,573.25 MHz)
- Assume a California Amplifier Model 13001 32 dB gain downconverter with a maximum allowable input level of -28 dBm

For these reasonable assumptions, the desired signal level is -47.8 dBm, or 19.8 dB below the BFO point. Or, in other words, BFO interference would not occur until the desired-to-undesired ("D/U") became -19.8 dB or worse.

8. But the D/U requirement for protection of adjacent-channel ITFS receive sites is 0 dB, or 19.8 dB more stringent (for this example). The threat to adjacent-channel ITFS receive sites must therefore be much greater, where a 0 dB D/U ratio is required instead of -19.8 dB D/U ratio.

9. And how much greater? Even assuming a Response Station EIRP of only 40 watts (46 dBm), the maximum possible EIRP for a 2-watt Response Station transmitter (Petitioner's proposed maximum) into a DL2400 13 dBi gain Response Station transmitting antenna, the distance that a Response Station must be separated from the assumed ITFS receiving antenna increases from the approximately 1,521 feet (0.288 miles) BFO threat distance to 2.82 miles for the adjacent-channel threat distance, for the case of main beam-to-main beam orientations and parallel polarizations. And since Petitioners have now abandoned their previous claim of using cross-polarization to protect ITFS receive sites, and since Petitioners want the right to install upstream Response Station transmitters wherever they please, with no prior application or review by the FCC or others, Petitioners are in no position to argue that the above scenario would never occur.

10. For a Response Station using the FCC 2-foot diameter reference antenna with a gain of 20 dBi, an EIRP of 53 dBm, or 200 watts, would be possible using a 2-watt Response Station transmitter; however, for purposes of these calculations, the Response Station EIRP will assumed

to be capped at 63 watts (48 dBm). As shown by the attached Figure 1, the area encompassed by the relative field pattern shape for the 2-foot FCC standard antenna with a main-beam distance of 3.55 miles is 2.09 square miles, as opposed to a mere 0.022-square-mile BFO footprint. Any single Response Station in this considerable area is an interference threat. Given that a two-way wireless cable system would undoubtedly have hundreds, if not thousands, of Response Station transmitters, the presence of an interference threat to adjacent-channel ITFS operations is obvious.

11. And based on the radiation pattern envelopes ("RPE") for the much less-directive Conifer DL2400 series antenna when vertically polarized, the following areas around a Response Station transmitter using such an antenna can be calculated:

Antenna	BFO Interference Area Interference Area	Adjacent-Channel Interference Area
FCC 2-foot reference antenna	0.022 sq. mi.	2.09 sq. mi.
VPOL DL2400, Ch. A1 (Fig. 2B)	0.037	3.57
VPOL DL2400, Ch. G4 (Fig. 3B)	0.035	3.39

Thus, and as shown in the attached Figures 2B and 3B, the area around an upstream Response Station transmitter that represents an adjacent-channel interference risk is substantially greater than the threat area for an antenna meeting the RPE of the FCC reference antenna.

Use of 20 dBi Gain Response Station Hub Receiving Antennas Would NOT Be Impractical

12. In their March 6, 1998, *ex parte* comments, Petitioners claim that use of 20 dBi gain rather than 10 dBi gain Response Station Hub receiving antennas would be impractical because of

- Tower loading constraints
- Insufficient tower space
- Tower sway problems
- Too narrow elevation pattern beamwidths.

13. We are unpersuaded by these suggestions why 20 dBi gain Response Station Hub antennas (instead of 10 dBi gain Response Hub antennas) could not be used. PCS cell sites regularly use sectorized receive antennas with gains of 14 to 20 dBi, which in turn require apertures of only 4 to 6 feet. Even when a PCS site needs to receive over a broad arc, the industry practice is to use several antennas aimed at portions of the arc to achieve the necessary coverage. And UHF TV broadcast stations typically use antennas with gains of 17 to 22 dBi (15 to 20 dBd), with elevation half-power beamwidths ("HPBW") of only 1.5° to 2.0°, but nevertheless manage to provide service by competently designing the appropriate amounts of electrical and mechanical

beam tilts to ensure that the elevation pattern beam is properly aimed at the population to be served. And we further find that Petitioners' claims of tower loading constraints, the lack of tower vertical real estate, and tower sway, to be particularly unpersuasive. These are common problems faced by the vast majority of RF spectrum users, and provide no justification why higher gain Response Hub receiving antennas should not be used.

Protection of Response Station Hubs

14. In their *ex parte* comments, submitted without benefit of a supporting engineering exhibit, Petitioners' attorney claims that CTN "got in backwards" in its claim that requiring an analog ITFS station to protect Response Station Hubs on the basis of the analog stations peak visual power rather than the analog station's average power 'would wildly stack the deck' in a Response Station Hub operator's favor.

15. CTN did NOT "get it backwards." Requiring NTSC analog stations to protect a Response Station Hub based on the analog station's peak visual power rather than the station's average power is a significantly more rigorous burden to the analog station. The average power of an NTSC analog station with 10% aural power is 3 dB lower than the station's peak visual power. Therefore, requiring NTSC analog stations to calculate interference to a digital signal based on the analog station's peak power rather than its average power represents a two-fold handicap to the analog station's ability to demonstrate protection of a digital Response Hub receive site.

There Has Been No Change in the CTN "Position"

16. At Footnote 10 of their *ex parte* comments, Petitioners accuse CTN of "changing its position" with regard to the ability to use the guardband spectrum for downstream MDS transmissions. This is no change in the CTN position, nor is the CTN position in any way inconsistent, as Petitioners allege.

17. As CTN's engineers, each with many years of experience in the design and preparation of ITFS and MDS facilities, and each familiar with the Commission's rules and processing procedures for those stations, we have no confidence in the "kluge scheme" (Petitioner's own characterization)* that would supposedly allow upstream Response Station transmitters with EIRPs of up to 2,000 watts (or even 63 watts, for that matter) to be interspersed at random with downstream adjacent-channel ITFS receive sites, and not cause chronic and debilitating interference to those receive sites. The interference problem would be even more severe (45 dB more so) for co-channel downstream ITFS receive sites; we are therefore assuming that even

* Page 16, second line, of Petitioners' January 8, 1998, Comments.

Petitioners would not attempt to use co-channel Response Station transmitters, and that the issue is therefore one of whether adjacent-channel Response Station transmitters could co-exist with downstream ITFS receive sites).

18. We think that the same chronic and debilitating interference would be caused to adjacent-channel downstream MDS operations, but, if Petitioners truly believe their own propaganda, namely that their complex interference calculation methodology will, in fact, ensure that no interference to adjacent-channel downstream operations would occur, then we have no objection to Petitioners using the 6 MHz (or wider) guardbands for downstream MDS use, because such use would not place ITFS spectrum at risk. Petitioners, at least, would then have a strong incentive not to "foul its own nest." The critical point is that it is the Petitioners, with their newcomer scheme for two-way use, that should bear the interference risk, and not existing ITFS licensees.

CTN Has Not "Ignored" Petitioners' "Contemplations" that Response Stations Will Use Directional Antennas

19. At Page 8 of the Petitioners' *ex parte* comments, Petitioners state that "CTN ignores that the Petitioners contemplate that omnidirectional antennas will not be used by used by Response Stations," and that "CTN appears to forget that the drafts of Sections 21.2 and 21.903(a) of the Rules proposed in the Petition deleted the phrase "(usually in an omnidirectional pattern)" specifically because "a substantial number of MDS booster stations and all MDS response stations will employ directional transmission antennas for frequency reuse and spectral efficiency."

20. These accusations are unwarranted. CTN has ignored nothing. The problem is that the wording used or proposed by Petitioners has been carefully chosen so as to be unenforceable. Petitioners can "contemplate" all they wish on a provision intended to provide interference protection to ITFS stations, but lacking a requirement in the Rules we believe it unwise to base interference protection on mere "contemplations." And although the wording in Section 21.903(a) of the proposed rules requires use of a directional antenna, it does not place any technical standards on just how directional the antenna has to be. Thus, any antenna that deviates from omnidirectional would qualify.

21. If Petitioners really wanted to put this issue to bed, they could have easily done so by proposing that Response Stations must use directional transmitting antennas meeting or exceeding the characteristics of the FCC 2-foot diameter reference antenna specified in Section 74.937(a) of the FCC Rules, or even some other minimum directionality requirement. Then there would have been no question that Response Station transmitters would not be using "token"

directional antennas that could easily circumvent the intent of the rule. But Petitioners have declined to do so and this omission is telling.

Petitioners Mis-Characterize CTN Cutoff Threshold Proposal

22. At Page 11 of Petitioners' *ex parte* comments, Petitioners object to the -76 dBm receive carrier level ("RCL") cutoff threshold proposed in the CTN Reply Comments, below which a "desired" signal need no longer be protected, as too high of a cutoff threshold for digital signals.

23. Petitioners ignore the fact that CTN only proposed the -76 dBm RCL cutoff for conventional, NTSC analog signals, for which a -76 dBm RCL cutoff is appropriate.† Our comments specifically recognized that different cutoff thresholds would probably be needed for digital transmissions, which could use other than 6-MHz bandwidths. We agree with Petitioners that even when a digital signal also uses a 6 MHz bandwidth, a lower cutoff threshold than that appropriate for a 6 MHz-wide NTSC analog signal may be appropriate.

Difficulty in Identifying and Locating Interference from Digital Sources

24. We are also concerned about the difficulty in identifying interference from digitally-modulated Response Station transmitters, an implicit chore if a *post hoc* interference avoidance scheme were to be adopted as Petitioners suggest. Unlike an NTSC analog signal, whose picture content can be observed and provide an important clue as to the identity of the interfering signal, or, alternatively, whose aural carrier can be monitored, again providing an indication of the identity of the offending station, a digital signal provides no such easy identification. Combined with the fact that the interference from Response Station transmitters would most likely not be continuously transmitting, locating such an interfering station would be difficult. ITFS licensees faced with one or two such interference sources might conceivably be able to locate the offenders, although most likely at considerable expense; ITFS licensees faced with scores, hundreds, or eventually thousands of such interfering stations would face debilitating interference, with no easy remedy. The ever dwindling resources of the FCC's Compliance and Information Bureau would be unlikely to be able to provide assistance, and certainly ITFS licensees should not be expected to invest in a fleet of direction finding trucks to hunt down interfering Response Station transmitters.

† Paragraph 12 of the February 6, 1998, Joint Engineering Exhibit in Support of CTN Reply Comments to MM Docket 97-217.

Summary

25. The Revised Methodology exhibit submitted as an attachment to Petitioners' Reply Comments is technically flawed for the reasons given above and, in fact, actually supports several of the points raised by CTN in its Comments and Reply Comments. Further, the Revised Methodology exhibit reinforces our belief that the proposed methodology is unduly complicated and represents an unwarranted interference threat to conventional downstream ITFS service. Finally, several of the claims made in Petitioners' *ex parte* comments are just plain wrong, or do not accurately characterize the CTN Reply Comments.

List of Figures

26. The following figures have been jointly prepared as part of these MM Docket 97-217 *ex parte* comments:

1. Figure illustrating BFO and adjacent-channel interference area footprints for FCC standard 2-foot diameter reference antenna
2. RPE for vertically-polarized Conifer DL2400 antenna at ITFS Channel A1 plus BFO and adjacent-channel interference area footprints
3. RPE for vertically-polarized Conifer DL2400 antenna at ITFS Channel G4 plus BFO and adjacent-channel interference area footprints.

John F.X. Browne, P.E.
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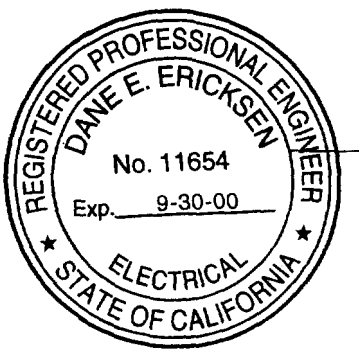
Consulting Engineers

Robert W. Denny, Jr., P.E.
Denny & Associates, P.C.
Consulting Engineers



Dane E. Ericksen, P.E.
Hammett & Edison, Inc.
Consulting Engineers

April 3, 1998

Affidavit

State of California
County of Sonoma | ss:

Dane E. Ericksen, being first duly sworn upon oath, deposes and says:

1. That he is a qualified Registered Professional Engineer, holds California Registration No. E-11654, which expires on September 30, 2000, and is employed by the firm of Hammett & Edison, Inc., Consulting Engineers, with offices located near the city of San Francisco, California,

2. That he graduated from California State University, Chico, in 1970, with a Bachelor of Science Degree in Electrical Engineering, was an employee of the Field Operations Bureau of the Federal Communications Commission from 1970 to 1982, with specialization in the areas of FM and television broadcast stations and cable television systems, and has been associated with the firm of Hammett & Edison, Inc., since October 1982,

3. That the firm of Hammett & Edison, Inc., Consulting Engineers, has been retained on behalf of the Catholic Television Network ("CTN"), representing numerous Instructional Television Fixed Service ("ITFS") stations licensed to, and operated by, the Roman Catholic Archdioceses and Dioceses throughout the United States, in support of supplemental CTN *ex parte* comments to MM Docket 97-217 concerning two-way, "cellularized" ITFS and Multipoint Distribution Service ("MDS") stations,

4. That such engineering work has been carried out by him or under his direction and that the results thereof are attached hereto and form a part of this affidavit, and

5. That the foregoing statement and the report regarding the aforementioned engineering work are true and correct of his own knowledge except such statements made therein on information and belief and, as to such statements, he believes them to be true.

Dane E. Ericksen, P.E.

Subscribed and sworn to before me this 3nd day of April, 1998

CRS 2

JERI L. THOMSEN
COMM. #1028103
NOTARY PUBLIC-CALIFORNIA
SAN MATEO COUNTY
My Comm. Expires May 29, 1998

CRS 1

Methodology exhibit reinforces our belief that the proposed methodology is unduly complicated and represents an unwarranted interference threat to conventional downstream ITFS service. Finally, several of the claims made in Petitioner's *ex parte* comments are just plain wrong, or do not accurately characterize the CTN Reply Comments.

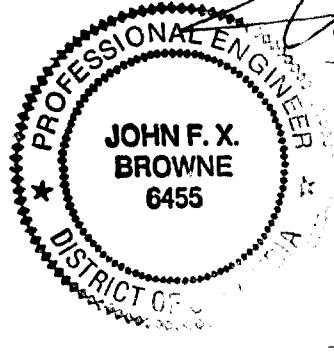
List of Figures

29. The following figures have been jointly prepared as part of these MM Docket 97-217 *ex parte* comments:

1. Figure illustrating BFO and adjacent-channel interference area footprints for FCC standard 2-foot diameter reference antenna.

2. RPE for vertically-polarized Conifer DL2400 antenna at ITFS Channel A1 plus BFO and adjacent-channel interference area footprints.

3. RPE for vertically-polarized Conifer DL2400 antenna at ITFS Channel G4 plus BFO and adjacent-channel interference area footprints.



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April 2, 1998